the useless nitrogen together with the oxygen not required may be eliminated and set free in the floats "in order to serve a mechanical purpose." He suggests that since the proportion of oxygen in the vesicles is less than in atmospheric air or in air dissolved in sea water, the plant must use up some of the oxygen "for other purposes than levitation." This last suggestion evidently means that the gas is modified by the metabolism of the tissues through which it passes.

In regard to (3) we shall await with interest to see whether the absence of carbon dioxide from the floats of marine algae is confirmed by other workers on other species.

On the whole, the paper is a clear, clean-cut statement of the problem and of the results of the investigation, although in a few places its scientific value might be improved by assuming a less teleological point of view.—GEORGE B. RIGG.

Cecidiology.—Among the American papers by botanists is one by STEWART[9] on the gall caused by *Andricus punctatus* Bassett. The author has made a very careful study of the histology of the gall, which he has compared with the histology of tissues formed in the healing of wounds. In his summarization on this point he says:

> The following conditions in this gall can be correlated with similar conditions in traumatic tissue: (1) a recapitulation of similar conditions of ray structure; (2) a vertical shortening of the broad rays; (3) the presence of ball-formations in the wood, which appear only in tangential sections; (4) a parting of the fibers in the vicinity of the larval chambers, similar to the condition resulting from longitudinal wounds; (5) isodiametric parenchyma cells around the base of the larval chambers with irregularly distributed fibers and other woody elements among them; (6) a great reduction in the number, or an entire lack of vessels; (7) a shortening of many of the cells of the wood; (8) absence of distinct annual rings of growth; (9) a suggestion of the return of the cambium to normal activity after a time; (10) woody inclusions in the bark.

Unfortunately, the bibliography is not satisfactory in that it includes some papers which have much less bearing on the subject than certain papers which are not included. Also, some of the statements in the first part of the paper concerning our knowledge of the anatomy of galls are misleading. The reviewer also questions the statement of the title of the paper, in that the inclusion of the generic name of the gall insect would have made the title much more suggestive to those who may wish to become informed on the literature of the subject. However, the author has brought out a number of points which are frequently overlooked by students of abnormal plant growths.

Another very excellent paper is by LUTMAN[10] on club root, in which the author discusses the relation of *Plasmodiophora Brassicae* to its hosts and the

[9] STEWART, ALBAN, Notes on the anatomy of the *punctatus* gall. Amer. Jour. Bot. 1:531–546. *pls. 2.* 1914.

[10] LUTMAN, B. F., Studies on club root. Univ. Vermont, Bull. 175. pp. 27. 1913.

structure and growth of its plasmodium. The parasite gains entrance to the host through the epidermis or the root hairs, and thence from cell to cell either by penetrating the cell walls or by division of the host cells, each daughter cell containing a part of the parasite. The parasite is most abundant in the cortex, but is always found in the central cylinder. The infected cells hypertrophy, but there is no serious interference in nuclear or cell divisions until the disease is well advanced, when both processes are suspended. Although the author has not made a definite statement on this point, it appears from the general discussion and the drawings that the hypertrophy is most pronounced in the primary cortex. This is to be expected, but a careful study to determine the extent to which the various groups of cells are susceptible to enlargement as a result of stimulation by the parasite would be well worth while. The discussion of the character and life history of the parasite is excellent.

A brief paper by HEALD[11] gives a description and results of inoculation experiments with a gall on *Prosopis glandulosa*. The gall is probably due to *Bacterium tumefaciens* Smith and Townsend.

Among the most important contributions to cecidology by American entomologists, we find a brief paper by COCKERELL[12] on a mite gall on the red orpine (*Clementsia rhodantha* Gray), one of the Crassulaceae growing in the high altitudes of the Rocky Mountains. The flowers "were aborted to a dense, round mass of a dark crimson-like color, consisting of excessively tuberculated floral parts inhabited by an eriophid mite." The mite is similar to or possibly the same as *E. rhodiolae* Can. of *Rhodiola rosea* of Central Europe and Italy.

There is also a paper by SEARS[13] in which the author records, figures, and gives a brief description of 63 species of galls from Cedar Point, Ohio. These galls occur on 31 species of host plants representing 22 genera.

An important taxonomic paper has been published by FELT,[14] in which he lists a number of species and also describes several new species. This paper will enable the botanist to determine a large number of species which come to their attention.

WELLS[15] describes 22 unreported galls from Connecticut and figures many of them.

FULLWAY[16] gives a very interesting taxonomic paper on gall fly parasite as a result of studies on Mrs. ROSE PATERSON BLAKEMAN's collection in Uni-

---

[11] HEALD, F. D., Aerial galls of the mesquite. Mycologia **4**:37–38. *pl. 1.* 1914.

[12] COCKERELL, T. D. A., A mite gall on *Clementsia*. Entomol. News **25**:466. 1914.

[13] SEARS, PAUL B., The insect galls of Cedar Point and vicinity. Ohio Nat. **15**: 377–388. *pls. 4.* 1914.

[14] FELT, E. P., Additions to the gall midge fauna of New England. Psyche **21**: 109–114. 1914.

[15] WELLS, B. W., Some unreported cecidia from Connecticut. Ohio Nat. **14**: 289–296. *pls. 2.* 1914.

[16] FULLWAY, D. T., Gall fly parasite from California. Jour. N.Y. Ent. Soc. **20**: 274–282. 1914.

versity of California. Although this paper deals primarily with taxonomic entomology, it contains many good records of American cecidia.—MEL. T. COOK.

Cytology of the Uredineae.—FROMME[17] described the processes taking place in the formation of spores of the flax rust, *Melampsora Lini* (Pers.) Desm., thereby adding another rust to those whose life histories are fully known. Interest in these forms centers largely in the aecidium. The sequence of events here is essentially like that occurring in aecidia of the *Caeoma* type, and differs only in the formation of two sterile cells above each gamete instead of one. The gametes fuse laterally in pairs, but occasionally irregularities apparently occur, since basal cells with three or more nuclei are found; however, the mode of origin of these cells was not observed. The spermatiophores also differ from the usual form. They are divided into a number of cells, from each of which a branch bearing a spermatium arises. The spermagonia and aecidia are closely associated and mature at the same time. The formation of the uredospores and teleutospores offers nothing noteworthy.

In a preliminary paper, KUNKEL[18] gave an account of the highly interesting discovery that the widely distributed blackberry rust (*Caeoma nitens*), which as a result of infection experiments reported by TRANZSCHEL and by CLINTON has been regarded as the aecidial form of *Puccinia Peckiana*, is in reality a rust of the *Endophyllum* type. This conclusion was based upon the observation that the aecidiospores of this fungus on germination produce promycelia and sporidia instead of germ tubes. The nuclear phenomena occurring in the germinating aecidiospores are described in a later paper. The processes agree in all essentials with those in the germinating aecidiospore of *Endophyllum*. At maturity the aecidiospore contains two nuclei; these fuse just before germination begins, so that the germinating aecidiospore is uninucleate. The fusion nucleus usually passes into the germ tube, where two divisions take place. Occasionally the first division occurs in the spore, as also reported by HOFFMAN[19] for *Endophyllum Sempervivi*. Five cells are formed in the promycelium; the basal one, which is continuous with the spore cavity, contains very little protoplasm and no nucleus. Sporidia arise from the other cells in the usual way. At the time of germination the sporidia are generally binucleate as a result of a division of the original nucleus. These facts, as well as some negative results of infection experiments on blackberry leaves reported by the author, leave no doubt that the orange rust of the blackberry is an independent fungus of the type of *Endophyllum*, and not, as hitherto supposed, the aecidial generation of

[17] FROMME, F. D., Sexual fusions and spore development of the flax rust. Bull. Torr. Bot. Club **39**:113–129. *pls. 2.* 1912.

[18] KUNKEL, L. O., The production of promycelium by the aecidiospores of *Caeoma nitens* Burrill. Bull. Torr. Bot. Club **40**:361–366. *fig. 1.* 1913.

———, Nuclear behavior in the promycelium of *Caeoma nitens* Burrill and *Puccinia Peckiana* Howe. Am. Jour. Bot. **1**:37–47. *pl. 1.* 1914.

[19] Rev. BOT. GAZ. **54**:437. 1912.